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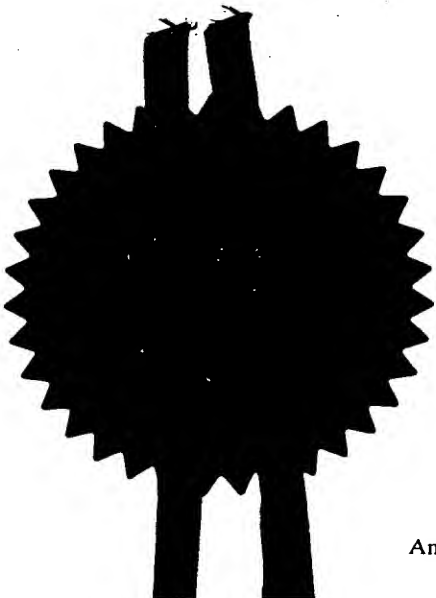
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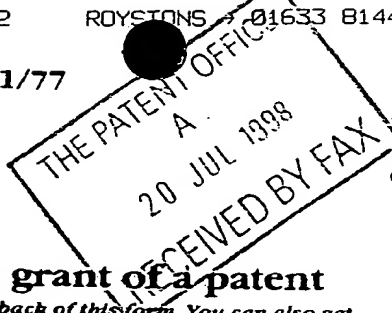
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1. Your reference

SMC/LF/P4107

2. Patent application number

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20 JUL 1998

9815641.7

3. Full name, address and postcode of the or of each applicant (underline all surnames)

Danmere Limited
Whitehall
75 School Lane
Hartford Northwich
Cheshire CW8 1PF

Patents ADP number (if you know it)

If the applicant is a corporate body, give the country/state of its incorporation

United Kingdom

6-8662000

4. Title of the invention

Improvements in and relating to the delayed viewing of screen readable signals such as a television broadcast

5. Name of your agent (if you have one)

"Address for service" in the United Kingdom to which all correspondence should be sent (including the postcode)

ROYSTONS

Tower Building
Water Street
Liverpool
L3 1BA

Patents ADP number (if you know it)

1438001

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Country

Priority application number
(if you know it)

Date of filing
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7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application

Number of earlier application

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Description

Claim(s)

Abstract

Drawing(s)

10

3

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4

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Statement of inventorship and right to grant of a patent (*Patents Form 7/77*)

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Signature

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17-07-98

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Title: Improvements in and relating to the delayed viewing of screen readable signals such as a television broadcast

The present invention relates to method and apparatus facilitating the delayed viewing of a television or video or other screen readable signal.

The invention has particular application to the delayed viewing of a television broadcast. There are occasions when someone viewing a real time television broadcast would benefit from an ability to interrupt viewing of the real time broadcast and to take up viewing sometime later without losing any of the intervening transmission or any transmission occurring when viewing is re-commenced. For example a viewer may be called away from the television momentarily, for example to answer the door or telephone call. Presently the only option is to accept that some of the transmission will be missed until the viewer is able to return to viewing the real time transmission or, if a video cassette recorder is available, to commence recording of the transmission for viewing at a later date when that transmission has finished, where for example the nature of the transmission is such that the viewer would not wish to commence viewing from anywhere other than from where the original interruption took place.

The present invention aims to provide a solution.

Accordingly, one aspect of the invention provides a method permitting the delayed viewing of a continuous sequential signal transmission, the method comprising recording a digitised version of the continuous sequential signal transmission on an ongoing basis onto a digital recording medium, and subsequently

reading the recorded signals whilst continuing to record the real time transmissions, and converting the recovered signals into a screen readable form for display and viewing on a television.

Conveniently the recording medium is divided into a plurality of memory blocks which are recorded sequentially. The memory blocks provide a finite capacity of memory. Preferably the method comprises recording in the memory blocks in a sequential fashion on a cyclical basis when viewing has been re-commenced within a time period covered by the finite memory of the digital recording medium. Where the finite capacity of the digital recording medium is about to be exceeded and viewing has not been re-commenced the method further comprises automatically triggering the operation of a video cassette recorder to record the transmitted signals for later viewing. Recording of the digital recording medium may be performed continuously whenever viewing is taking place or solely on operation of a user command for example in the event of an interruption taking place which dictates operation of the interrupt facility. In an alternative embodiment, instigation of the interrupt facility simultaneously instigates operation of a video cassette recorder. Tape positioning may be controlled automatically according to proposals in one of our co-pending patent applications and is not described further herein.

According to another aspect of the invention there is provided apparatus to permit the delayed viewing of a continuous sequential signal transmission, the apparatus comprising means to receive and process the continuous sequential signal transmission and where necessary to convert into a digital output, means to write the signal to a storage medium and means to read a signal recorded on the storage

medium, the write and read means being operable to permit reading of previously recorded signals whilst subsequently received signals are being recorded.

The digital storage medium conveniently comprises a plurality of recordable segments each having a finite capacity. Means is provided for recording the storage blocks in sequence and in a circulatory manner to record over previously recorded blocks if necessary.

Control means may be provided for instigating write and read functions. An on screen display is preferred from which the viewer can select from available options. Means is provided for identifying where the current write sequence commenced so that a subsequent read command starts at that point. Once reading has commenced the writing and reading can continue on a rolling basis with the read blocks being written over in due course. This is only possible where the read command has commence within a time span which can be accommodated by the finite capacity of the storage medium.

Advantageously the apparatus further comprises means for triggering the operation of a video cassette recorder to record the signal transmission either simultaneously with commencement of the interrupt record facility or at a predetermined time thereafter, for example when the finite storage capacity is about to be exceeded. An infra-red controller is preferably employed. A remote handset provides a convenient means of selecting operation of the video cassette recorder and/or the digital recording medium, preferably in conjunction with an on-screen display of the available functions.

In one embodiment the digital recording medium comprises a hard disk which

can be part of a computer or a set top device. In an alternative embodiment the signal is recorded on a digital video disk provided with both read and write heads which are operable to record and play video without interruption. Preferably, the apparatus further comprises means for digitising analog signals optional means for retrieving external video signals or external data, as well control circuitry for producing text or graphics for display on the TV screen.

Another aspect of the invention provides a method permitting the delayed viewing of a continuous signal transmission upon selection of additional on screen menus, the method comprising automatically recording a version of the continuous signal transmission onto a digital storage medium when additional temporarily on screen graphics and/or text and/or video images are displayed, re-commencing a delayed read of digitally stored signal and displaying same when prompted or automatically when temporarily on screen graphics and/or text and/or video images are no longer displayed.

The present invention will now be described further hereinafter by way of example only and with reference to the accompanying drawings in which:-

Figure 1 illustrates diagrammatically apparatus for implementing the invention according to a first embodiment,

Figure 2 illustrates diagrammatically apparatus for implementing the invention according to a second embodiment,

Figure 3 illustrates diagrammatically apparatus for implementing the invention according to yet another embodiment,

Figure 4 illustrates diagrammatically a delayed viewing/read facility according

to one aspect of the present invention, and

Figure 5 illustrates diagrammatically read and write features of the invention.

Referring to Figure 1, Illustrated pictorially is a video cassette recorder referenced VCR and a television with monitor screen referenced TV. Illustrated diagrammatically in block form is associated signal processing apparatus which according to a preferred embodiment of the invention is incorporated in a set top box or other stand alone unit represented by dotted outline 1. However, the desired signal processing apparatus may be incorporated in either the VCR or TV or any other component intended to be used with or incorporate one or both a TV or VCR. In other embodiments the connection with the VCR is optional.

The signal processing apparatus comprises a tuner T, an analog digital converter or codec C, a central processing unit CPU, a memory M associated with the CPU and a simultaneously readable and writable digital storage medium comprising a hard disk or other media S. Also illustrated is an infra-red receiver and transmitter IR, a video system VS and encoder and decoder means E and D respectively.

The set top box 1 has an input port 3 to receive television broadcasts or other continuous sequential signal transmission intended for viewing on a VDU or television screen TV. The tuner T decodes the selected broadcast (assumed to be an analog signal in the illustrated embodiment) and transmits it to the analog digital converter C along signal line 4. A corresponding signal is also transmitted either directly to the VCR and the TV or in the case of the illustrated embodiment by way of encoder E. The function of the encoder will be described further hereinafter. The analog digital

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converter C converts the signal from the tuner into a digital signal suitable for recording on the digital storage medium, which in case of a set top box comprises hard disk. A write head and a read head are provided and shown diagrammatically by arrows R and W. The central processing unit runs the installed software and controls operation of the read write functions, the infra-red control unit, the encoder, the decoder and the video system. Appropriate control paths being shown in the diagram. The output to the television is shown at 11. Where the function of the digital converter is required the real time signal finds its way from the input 3 to the output 11 via the tuner, line 4, line 5 and line 6. Where the signal is to be recovered from the hard disk by the read head R it is transmitted to the output by way of lines 5 and 6. Where the TV picture is being recovered from the video cassette recorder it is transmitted to the output by way of line 6 and via the video system in the illustrated embodiment. In an alternative embodiment the output from the VCR could be directed to the analog digital converter to facilitate writing to the hard disk and subsequent delayed retrieval via lines 5 and 6.

In our co-pending applications we describe how file indexes and tape position data can be recorded onto a video tape and techniques for determining tape position and generating on-screen displays for selecting available options. The central processing unit CPU runs software which controls these aspects and those of the present invention and controls the generation or transmission of any on-screen display. The memory M stores the VCR characterisation data, current file index and the control program. The encoder is provided to encode any index information, or other data for recording on the tape and the decoder decodes it for display on the

screen and/or storage memory.

In use, where a television program is being viewed on the television screen and the viewer has to interrupt viewing for whatever reason, he can operate a controller, for example a hand held infra-red controller, to display, in the context of this invention, various menu options on-screen in relation to operation of what we term the interrupt/delayed read facility. In one embodiment where such an option is selected recording of the received television program commences on the hard disk with successive blocks of memory being recorded. The position in the memory where recording is started is noted. The amount of available recording space is known and continuously monitored by the central processing unit. The hard disk maybe capable of storing say 10 minutes worth of broadcast. Thus, if the viewer returns within that time he can then select from the options menu to continue viewing on a delayed viewing basis by instigating a read function whereupon the recorded transmission is read from a point where recording commenced. Writing of the transmission continues as does reading over of the subsequently recorded material until the user de-selects the interrupt/delayed read facility. By this means the viewer does not miss any of the transmission albeit that he views it sometime after its real time transmission.

The ability to view a transmission on a delayed read basis offers a number of additional benefits. For example, whenever the interrupt/delayed read function is operating it is possible to instigate an instant replay function or to perform the equivalent of a short rewind, and replay an earlier section of the transmission albeit that the amount of back tracking which is possible is limited to the amount of

available program memory between the current read position and the current write position. The control unit can also include a fast forward function so that the material which is being read on a delayed read basis can be viewed more quickly or irrelevant material skipped through e.g. commercial breaks; thus enabling the viewer to get up to real time transmission should he so wish.

Further options facilitate operation of the video cassette recorder to record the transmission to video tape either automatically if viewing is not commenced within the limitations of the capacity of the digital storage medium or instantly if this is preferred. The control of the video tape position to ensure adequate space can be achieved in a manner described in our co-pending applications and is not described further hereinafter.

Reference is now made to Figure 2 which shows an embodiment of the invention which uses a digital video disk as the digital storage medium. The digital video disk (DVD) is provided with write and read heads W and R respectively which are able to function simultaneously. In the illustrated embodiment it is assumed that the signal being received is a digital television signal which goes directly into a digital receiver DR which is then relayed to the digital video disk for recording purposes or directly to line 6 which carries the TV picture signal to the output line 11 by way of a video system VS. The circuitry further includes a central processing unit (CPU) a memory M, and an infra-red controller IR to receive controls from a hand set. These function as described previously in the context of the invention and as concerns generation of on-screen displays in relation to indexes stored in memory and selectable programming options. In the illustrated embodiment optional inputs are

shown at X and Y feeding an interface I and then into a coder C. Input X represents an external video signal and input Y an external data signal.

In operation the digital signal is decoded and the viewer can watch the decoded signal on the television monitor in the usual way. Again the control unit CPU can be used to generate text or graphics for on-screen viewing, these being relayed to the video system via line 8. Using an on-screen menu the user can select to instigate the interrupt/delayed read procedures in which case the signal can be written to the digital video disk when in the interrupt mode. Again, as with the previous embodiment the recordable digital video disk has a finite capacity. Where this not exceeded the viewer has the option to commence reading of the recorded material where after writing and reading is performed on the same basis as previously described.

Where the optional inputs are available then the control unit can be used to control recording of external video signals and/or external data onto the recordable digital video disk for subsequent replay on a delayed transmission basis or otherwise.

Figure 3 illustrates an embodiment which corresponds almost exactly to that of Figure 2 and like reference numerals have been used for corresponding parts but in this instance the television broadcast is assumed to be an analog signal which is decoded by tuner T passed along line 4 to the coder C where it is digitised and then passed to the recordable digital video disk DVD to be written to the disk where required. Again on-screen menus are used as described previously to facilitate easy operation of the system.

Referring now to Figure 4, here we illustrate diagrammatically an arrangement

which operates continuously on a delayed read basis. A recordable digital video disk DVD is interposed in a signal line 3 receiving real time television broadcasts and which feeds to the write head of the digital video disk. Processing circuitry is omitted for clarity. The information recorded is read after a predetermined (usually preset) interval by the read head and fed on a delayed read basis to the television TV along line 5. The intention here is to have this operating on a full-time basis so that the viewer is able to benefit from instant replays and also potential rewinds and fast-forwards in the jargon of tape recording. Thus as illustrated schematically in Figure 5 the digital disk may contain N segments of recordable memory which may have a total capacity equivalent to 10 minutes of video transmission and this is recorded on a continuous loop basis as indicated by arrow A. The memory can be retrieved for anything up to 10 minutes behind the real time transmission. In practice the read position is preferably just less than 10 minutes ahead of the record position to facilitate operation of fast-forward and rewind facilities, especially replay, without losing transmission continuity. Once a memory segment has been read it will be over-written in due course.

CLAIMS

1. A method permitting the delayed viewing of a continuous sequential signal transmission, the method comprising recording a digitised version of the continuous sequential signal transmission on an ongoing basis onto a digital recording medium, and subsequently reading the recorded signals whilst continuing to record the real time transmissions onto the said digital recording medium, and converting the recovered signals into a screen readable form and viewing on a television.
2. A method as claimed in claim 1 in which the recording medium is divided into a plurality of memory blocks and the method comprises recording said blocks sequentially.
3. A method as claimed in claim 1 or 2 and further comprising writing over previously recorded memory block when the available capacity of unrecorded memory blocks is exceeded.
4. A method as claimed in anyone of the preceding claims and further comprising the step of instigating operation of a video cassette recorder to record the signal transmission.
5. A method as claimed in anyone of the preceding claims in which instigation of the recording or reading step is selected from an on-screen menu.
6. Apparatus to permit the delayed viewing of a continuous sequential signal transmission, the apparatus comprising means to receive and process the continuous sequential signal transmission and where necessary to convert into a digital output, means to write the signal to a storage medium and means to

read a signal recorded on the storage medium, the write and read means being operable simultaneously to permit reading of previously recorded signals whilst signals currently being received are being recorded.

7. Apparatus as claimed in claim 6 in which the storage medium comprises a plurality of recordable segments.
8. Apparatus as claimed in claims 6 or 7 and further comprising control means to instigate write and read functions.
9. Apparatus as claimed in claims 6, 7 or 8 and comprising means to generate an on-screen display from which the write and read options can be selected.
10. Apparatus as claimed in anyone of claims 6 to 9 comprising means identifying where in the memory the current write command was commenced and means for directing the read head to commence reading from the same place on receipt of a read command.
11. Apparatus as claimed in anyone of claims 6 to 10 and further comprising control means to initiate operation of a video cassette recorder on commencement of the write command or at a prescribed interval thereafter.
12. Apparatus as claimed in claim 11 in which actuation of the video cassette recorder is selected from an on-screen display as one of a number of options.
13. Apparatus as claimed in anyone of claims 6 to 12 in which the storage medium is one of a hard disk or a digital video disk.
14. A method permitting the delayed viewing of a continuous signal transmission upon selection of additional on screen menus, the method comprising automatically recording a version of the continuous signal transmission onto a digital storage medium when additional temporarily on screen graphic and/or

text and/or video images are displayed, re-commencing delayed read of digitally stored signal and displaying same when prompted or automatically when said temporarily on screen graphics and/or text and/or video images are no longer displayed.

15. A method permitting the delayed viewing of a continuous sequential signal transmission substantially as hereinbefore described with reference to the accompanying drawings.
16. Apparatus to permit the delayed viewing of a continuous sequential signal transmission constructed and arranged substantially as hereinbefore described with reference to and as illustrated in the accompanying drawings.

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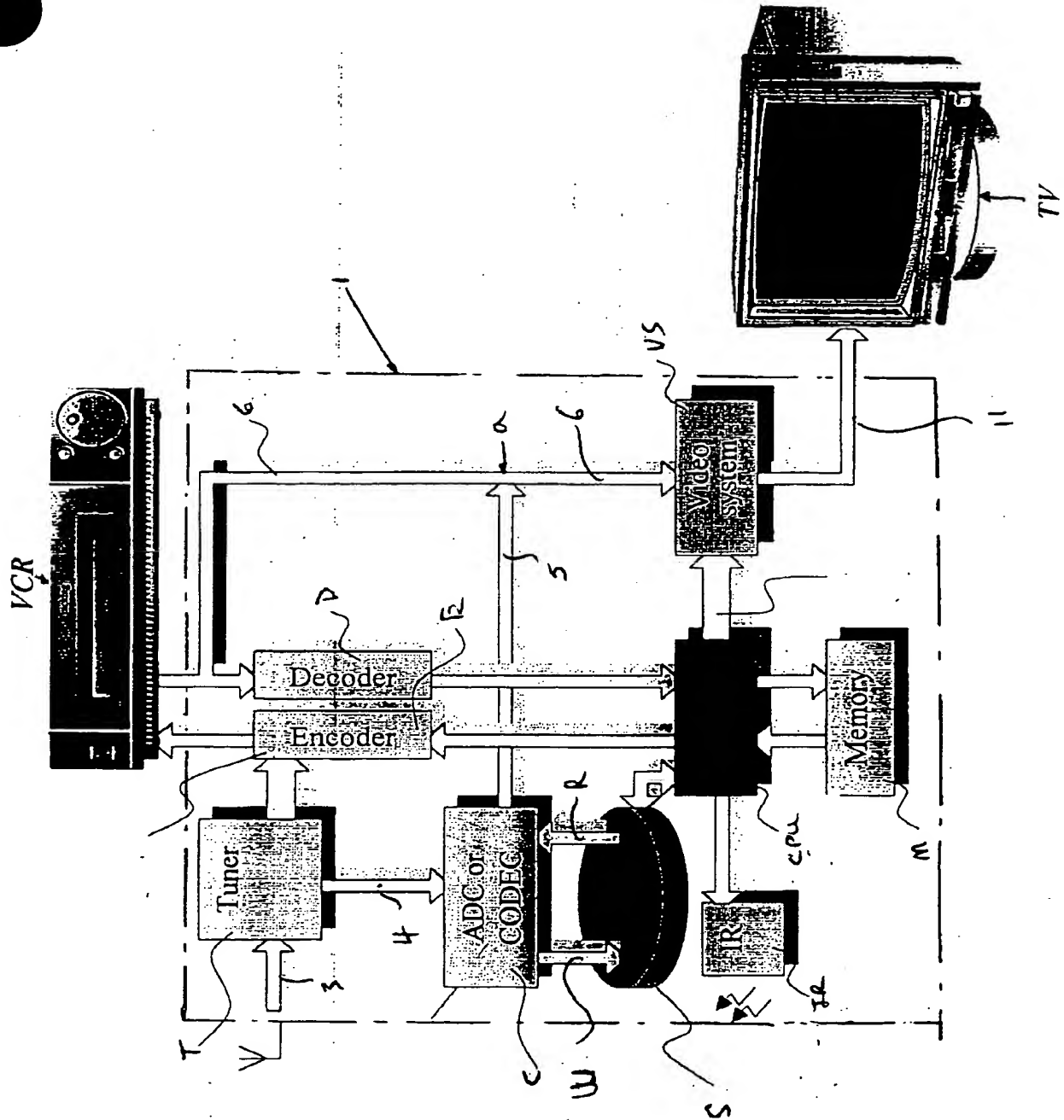


Fig 1

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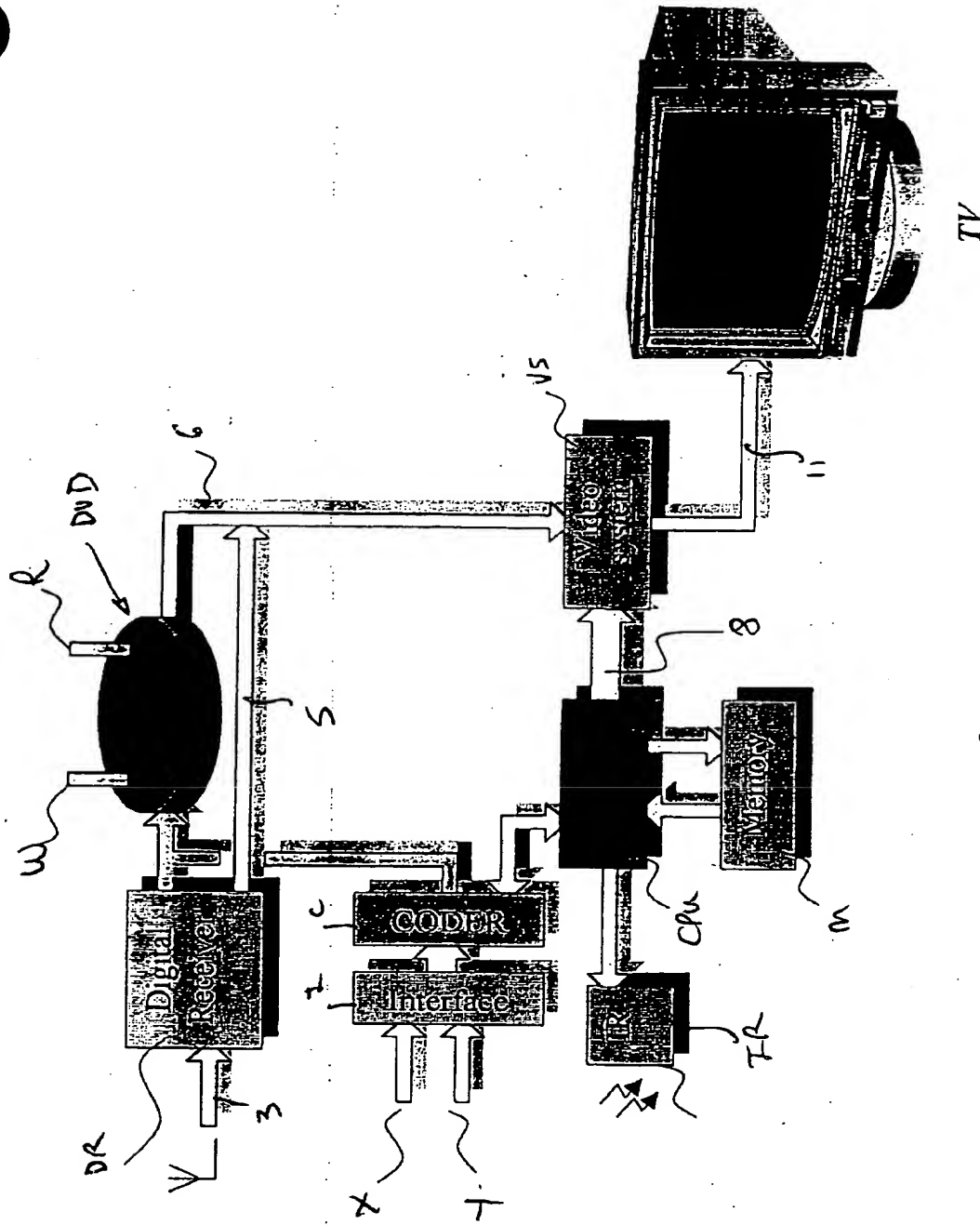


Fig 2

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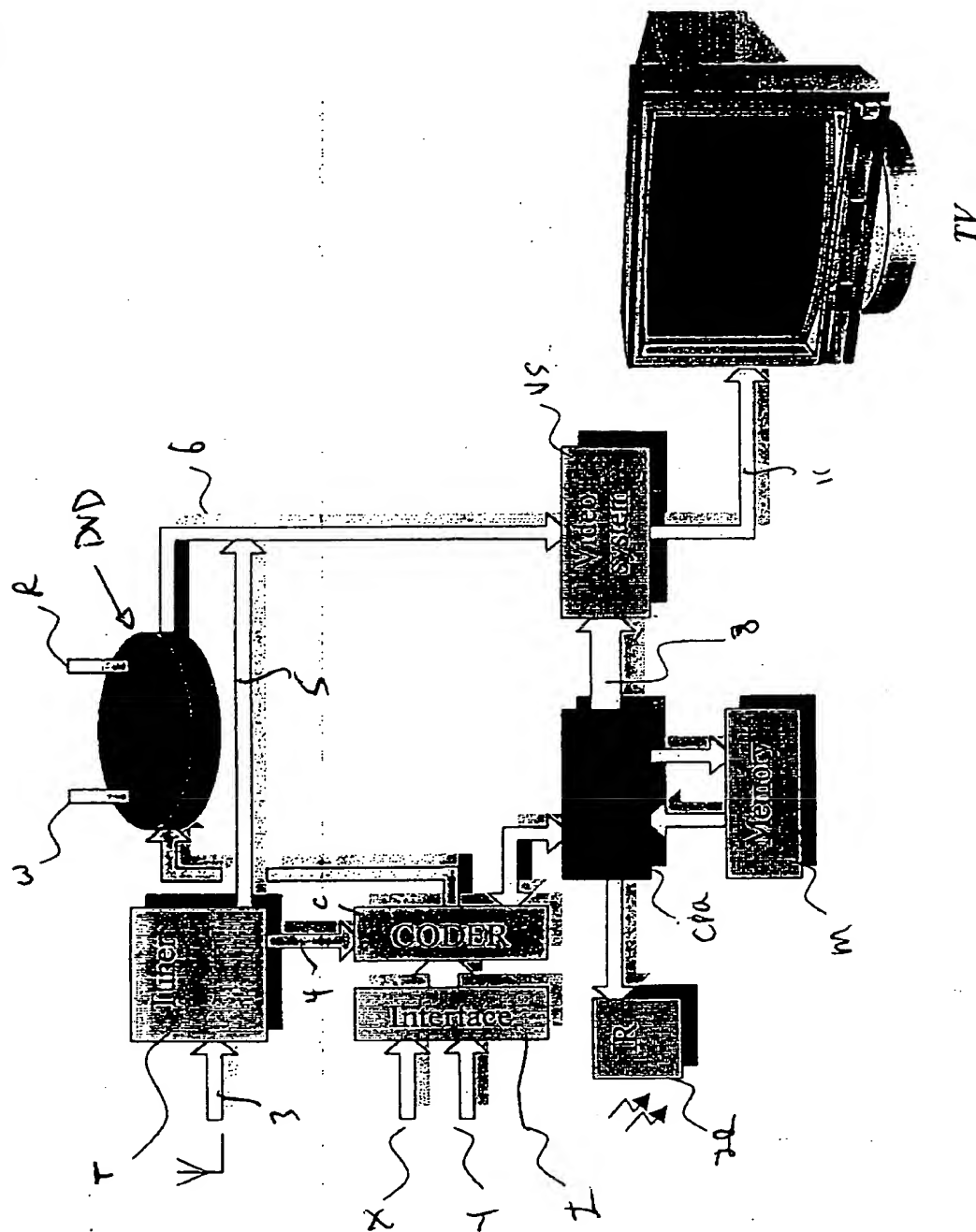
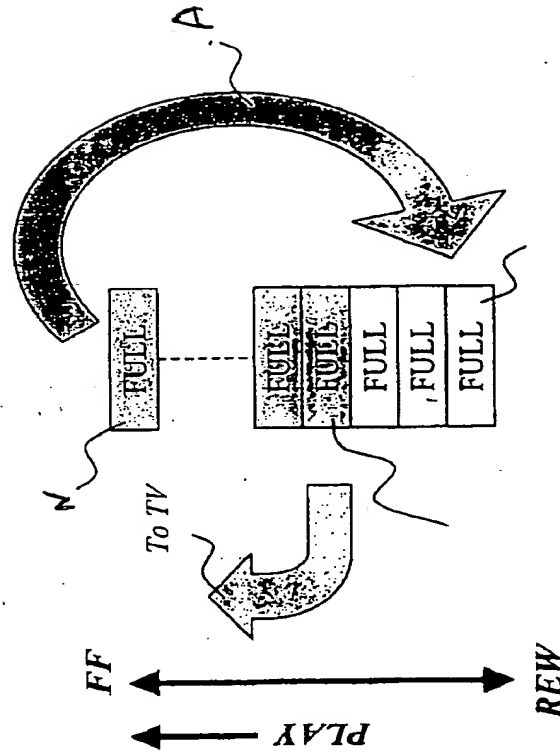
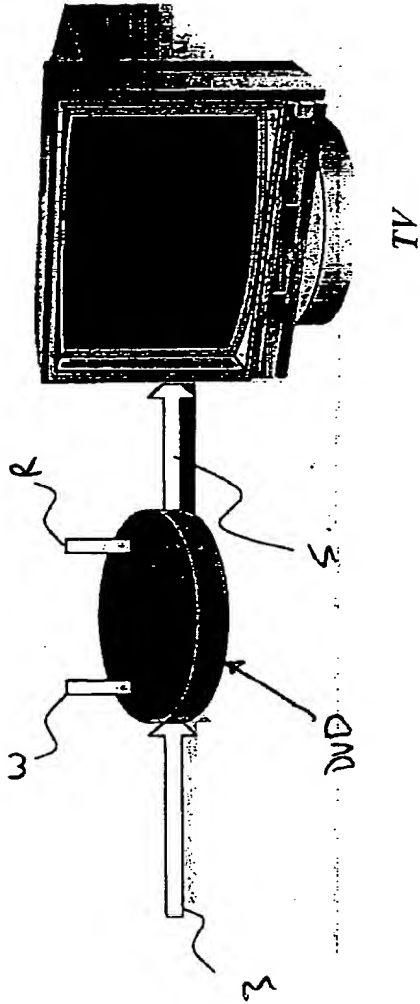


Fig 3

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